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1. (Original) A method for calibrating a coincidence imaging system which includes a plurality of radiation detectors, the method comprising:

5 measuring a plurality of coincidence radiation events associated with a point radiation source;

assigning initial values for a set of fitting parameters;

applying a minimization algorithm including:

10 calculating lines of response (LOR) based upon the fitting parameters and the measured radiation events,

generating a figure of merit characterizing the apparent size of the point radiation source based upon the LOR's, and

15 optimizing the fitting parameters to produce a minimized figure of merit; and

extracting from the optimized fitting parameters a correction factor relating to a positional coordinate of a detector.

2. (Original) A method for imaging using a plurality of radiation detectors, the method comprising:

measuring a plurality of coincidence radiation events associated with a point radiation source;

5 assigning initial values for at least one fitting parameter;

calculating lines of response (LOR) based upon the at least one fitting parameter and the measured radiation events;

10 generating a figure of merit characterizing the apparent size of the point radiation source based upon the LOR's;

optimizing the at least one fitting parameter using a minimization algorithm which includes iteratively repeating 15 the calculating and generating steps to produce a minimized figure of merit;

extracting from the at least one optimized fitting parameter at least one correction factor;

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20 subject; acquiring a set of radiation data from an associated
21 correcting the radiation data for camera misalignment
22 by correcting the spatial coordinates of the detected radiation
23 events using the at least one correction factor; and
24 reconstructing an image representation from the
25 corrected radiation data.

3. (Original) The imaging method as described in
claim 2, wherein the at least one fitting parameter includes:
a parameter related to the radial positional
coordinate of a detector.

4. (Original) The imaging method as described in
claim 2, wherein the at least one fitting parameter includes:
a parameter related to the tangential positional
coordinate of a detector.

5. (Original) The imaging method as described in
claim 2, wherein the at least one fitting parameter includes:
a parameter related to the orientational positional
coordinate of a detector.

6. (Original) The imaging method as described in
claim 2, wherein:
the step of generating a figure of merit includes
summing a distance of closest approach of each LOR to a spatial
5 point; and
the at least one fitting parameter includes the
positional coordinates of the spatial point.

7. (Original) The imaging method as described in
claim 2, wherein:
the step of generating a figure of merit includes
summing the square of a distance of closest approach of each LOR
5 to a spatial point; and
the at least one fitting parameter includes the
positional coordinates of the spatial point.

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8. (Original) The imaging method as described in claim 7, wherein the step of generating a figure of merit further includes:

5 discarding LOR's whose distance of closest approach is greater than a preselected distance.

9. (Original) The imaging method as described in claim 2, wherein the step of generating a figure of merit further includes:

5 obtaining a crossing point of each pair of LOR's; and calculating a standard deviation of the crossing points.

10. (Original) The imaging method as described in claim 2, wherein the step of generating a figure of merit further includes:

5 obtaining a distance of closest approach for each pair of LOR's; and calculating a standard deviation of the obtained distances.

11. (Original) The imaging method as described in claim 2, wherein the number of detectors is N and the fitting parameters include:

5 Δr_i , $i=1$ to N , where Δr_i is a correction for the radial coordinate of the i th detector;

Δt_j , $j=1$ to N , where Δt_j is a correction for the tangential coordinate of the j th detector; and

5 $\Delta \theta_k$, $k=2$ to N , where $\Delta \theta_k$ is a correction for the orientational coordinate of the k th detector.

12. (Original) The imaging method as described in claim 11, wherein the fitting parameters further include:
positional coordinates of the point radiation source.

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13. (Previously Presented) A method of PET imaging comprising:

coincidence detecting radiation events from a calibration source with at least two detector heads;

5 calculating correction factors that correct for mechanical misalignment of the detector heads from the coincidence detected calibration source radiation, the calculating including:

10 generating a figure of merit which characterizes an apparent size of a point source of radiation based on lines of response,

optimizing fitting parameters based on the figure of merit;

15 during a diagnostic imaging procedure performed on a subject, generating image data in response to radiation collected with the detector heads;

correcting the image data with the correction factors; and

20 reconstructing the corrected image data into an image representation.

14. (Currently Amended) A coincidence imaging system comprising:

a gantry;

5 a plurality of flat panel detectors disposed about the gantry;

a data memory which stores measured data about radiation events detected by the detectors;

10 a calibration memory which stores a plurality of calibration parameters for correcting data measured during a patient scan; and

a processor in communication with the calibration memory and with the data memory which calculates the calibration parameters by a minimization algorithm that includes:

15 generating a figure of merit
characterizing an apparent size of a measured point
radiation source, and

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20 optimizing fitting calibration parameters with respect to acquired radiation data associated with the figure of merit to minimize an apparent size of a the point radiation source based on lines of response.

15. (Previously Presented) A coincidence imaging system comprising:

5 a gantry;
a plurality of detectors disposed about the gantry;
a data memory which stores measured data about
radiation events detected by the detectors;
10 a calibration memory which stores a plurality of calibration parameters for correcting data measured during a patient scan; and

15 a processor in communication with the calibration memory and with the data memory which calculates the calibration parameters which are extracted from fitting parameters using a minimization algorithm, the minimization algorithm including:

20 calculating lines of response (LOR) based upon the fitting parameters and the measured data;
generating a figure of merit characterizing the apparent size of the point radiation source based upon the LOR's; and
optimizing the fitting parameters to produce a minimized figure of merit.

16. (Original) The imaging system of claim 15 wherein the calibration parameters include:
parameters relating to positional coordinates of the plurality of detectors.

17. (Original) The imaging system of claim 16, wherein:
the gantry is a rotatable gantry which acquires measured data over a range of gantry angular positions.

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18. (Previously Presented) The imaging system of
claim 15, wherein:

the figure of merit is generated by summing the
square of a distance of closest approach of each LOR to a
5 spatial point; and

the fitting parameters include the positional
coordinates of the spatial point.

19. (Previously Presented) The imaging system of
claim 15, wherein the generating of the figure of merit
includes:

obtaining a crossing point of each pair of LOR's; and
5 calculating a variance of the crossing points.

20. (Original) The imaging system of claim 14,
wherein the minimization algorithm further includes:

discarding measured data about radiation events whose
energy is outside a preselected energy range.